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EMISSION REPORT

ALUMINUM RECOVERY SMELTER
THANE DEVELOPMENT LTD.
KESWICK, ONTARIO

ARB-124-87

September 1987

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A48
1987
MOE

Ministry
of the
Environment
Ontario

E. PICHÉ, Director
Air Resources Branch

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EMISSION REPORT
ALUMINUM RECOVERY
SMELTER
THANE DEVELOPMENTS LTD.
KESWICK, ONTARIO

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September 1987

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ACKNOWLEDGEMENTS

Independent Measurement and Technology Inc. (IMET) would like to thank Mr. George Marson and Mr. Ron Brooks from the Ministry of the Environment and Mr. Vladimir Uselac of Thane Developments Ltd. for their assistance during the testing program.

1.0 SUMMARY

Independent Measurement and Technology Inc. (IMET) conducted stack emission testing at the Thane Developments Ltd. aluminum recovery smelter in Keswick, Ontario on May 28 and 29, 1986.

Three particulate tests were completed on the exhaust stack from the aluminum smelter baghouse using methods in compliance with Ontario Ministry of the Environment (MOE) guidelines. The tests were witnessed by Mr. George Marson and Mr. Ron Brooks of the MOE. Process data was collected by MOE and Thane Developments Ltd. personnel.

The baghouse exhaust has an average particulate emission concentration of 79.7 mg/DSm^3 and an average particulate emission rate of 1.63 g/s. The particulate emission rate for tests M28-1 and M29-1 were similar for an average of 26.6 mg/DSm^3, while for test M29-2 the particulate emission rate was 148.2 mg/DSm^3. The only apparent change in process conditions was the batch composition containing material from Company B.

Particulate and impinger catches for the tests were analyzed by MOE Laboratory for a quantity of 10 metals and 5 anions. Opacity was recorded by an in-situ stack meter during the tests.

The stack gas flows, temperatures and moistures were similar for all runs. The average stack gas flow was 74,100 DSm^3/hr. The average stack gas temperature was 66.9 deg C and the average stack gas moisture was 1.57%.

1.0 RÉSUMÉ

Les 28 et 29 mai 1986, Independent Measurement and Technology Inc. (IMET) a procédé à des essais portant sur les émanations de la fonderie Thane Developments Ltd. située à Keswick en Ontario et spécialisée dans la récupération de l'aluminium.

Trois essais sur les particules provenant de la cheminée de la chambre de filtration de la fonderie ont été effectués au moyen de méthodes conformes aux directives du ministère de l'Environnement de l'Ontario. MM. George Marson et Ron Brooks, du ministère de l'Environnement, ont assisté aux essais. Les mesures ont été recueillies par le personnel du ministère et de Thane Developments Ltd.

La concentration moyenne de particules dans les émanations provenant de la chambre de filtration était de 79,7 mg/m^3 à l'état sec et le débit moyen d'émission de particules de 1,63 g/s. Les concentrations mesurées lors des essais M28-1 et M29-1 étaient semblables, soit en moyenne 26,6 mg/m^3 à l'état sec tandis que la concentration mesurée lors de l'essai M29-2 était de 148,2 mg/m^3 à l'état sec. La seule différence dans les conditions de traitement était la composition de la ferraille qui comprenait des matériaux provenant de la compagnie B.

Les particules et les substances recueillies au moyen de l'impacteur ont été analysées par le laboratoire du ministère de l'Environnement pour dix métaux et cinq anions. L'opacité a été enregistrée sur place par un appareil de mesure des gaz de cheminée pendant les essais.

Le débit, la températures et le degré d'humidité des gaz de cheminée étaient semblables dans tous les cas. En moyenne, le débit des gaz était de 74 100 m^3/h à l'état sec, la température de 66,9 $^\circ$C, et le degré d'humidité de 1,57 %.

2.0 INTRODUCTION

IMET was retained by the Ontario Ministry of the Environment to conduct emission testing on the baghouse exhaust stack from the aluminum recovery smelter at Thane Developments Ltd. in Keswick, Ontario. The purpose of the tests was to measure the emission rates of particulate and selected metals and anions. The scope of work included:

(1) Three (3) 120 minute particulate tests on the baghouse exhaust.

(2) Analysis of the samples (probe wash, filter, impinger) for a combination of elements and compounds selected from Cu, Ni, Zn, Cr, Pb, Fe, Mn, Ca, Mg, Al, F^-, Cl^- $SO_4^=$, NO_3^- + NO_2^-, NO_2^-. All field samples were returned to the MOE and the analysis performed at their laboratory.

(3) Preparation of report.

3.0 PROCESS DESCRIPTION

The Thane Development's Keswick operation recovers aluminum alloys from scrap aluminum. Appendix 3 contains furnace, baghouse and alloy specifications. The process consists of a filter rotary furnace semi-enclosed in a ventilation hood. The hood enclosure is ventilated on the ceiling and the gases are drawn through a baghouse by an ID fan and exhausted through a 14.0 m high stack to atmosphere.

Scrap aluminum is purchased from various suppliers in Canada and northeastern U.S.A., primarily foundries. Approximately 60% of the scrap is aluminum alloy 319A from Company A. The remainder of the scrap is aluminum alloy 308 from Company B (20%), Company C (10%), Company D (5%) and miscellaneous (5%).

The rotating furnace has a capacity for dross and flux of 2.4 m^3 with a maximum operating temperature of 1200 ^oC. The furnace burner has a maximum rated capacity firing #2 oil of 12,000,000 BTU/hr.

The scrap aluminum is loaded into the one end of the furnace with rock salt flux to assist aluminum recovery. The burner is pushed over the opposite end of the furnace and fired up to melt the scrap. The burner is fired at nominally 9 MMBTU/hr for approximately 1 hour, then it is turned down to reduce loss of aluminum due to oxidization. After all the scrap and flux are melted, the furnace rotation is stopped and the aluminum is tapped. Then the flux is discharged by tilting the furnace.

The baghouse is a 6 compartment Wheelabrator shaker type with a design capacity of 42,000 acfm. The baghouse has a net cloth area of 18,144 ft^2. The bags are 10 feet long and 5 inches in diameter of which 60% are Nomex and 40% are polyester. The baghouse is designed to isolate one compartment at a time and shake the bags. The isolation and shaker cycle time is 8-10 minutes. The baghouse was inspected and repaired shortly before the stack test.

4.0 SAMPLING LOCATION

Sampling was performed at the 1.18 metre diameter exhaust stack. Two 75 mm ports oriented 90° to one another were located 6.7 metres above the fan and 5.5 metres from the end of the duct transition above the fan. Since the sampling location was only 4.7 duct diameters downstream of the duct transition, the number of sampling points were increased to 24.

5.0 TESTING PROCEDURES

All sampling and analysis was performed in accordance with Ontario Ministry of the Environment guidelines as outlined in the Source Testing Code. Particulate sampling schedule and methodology, as well as process data requirements, were agreed upon with MOE and Thane Developments Ltd. personnel prior to beginning of testing. Descriptions of the test methods are included in the following sections.

5.1 Flow Measurement

Velocity measurements were taken using a pre-calibrated "S" type pitot tube in conjunction with a magnehelic pressure gauge. The equal area method, as specified by the Source Testing Code, was followed to determine the volumetric flowrate. The method required dividing the duct into 24 equal area zones. The velocities were determined within each zone and averaged. Stack static pressure and atmospheric pressure were recorded.

5.2 Stack Temperature Measurements

Temperature measurements were made simultaneously with the velocity measurements. A commercial chromel-alumel type "K" thermocouple in conjunction with a digital temperature indicator was used.

5.3 Stack Gas Composition

The stack gas composition was determined using a Fyrite CO_2 indicator and a Teledyne O_2, CO monitor. Stack gas moisture was measured by condensation of sample gas.

5.4 Particulate Sampling

Particulate sampling methodology was multi-point isokinetic. The particulate sampling train is illustrated in Figure 1.

5.4.1 Sampling Train Preparation

The sampling train gas meter, probe, magnehelics and temperature indicators were calibrated according to the MOE Source Test Code. The sampling train glassware was rinsed with deionized (DI) water and 5% aqua regia (AR) prior to a final deionized water rinse which was saved as a glassware background sample. All sample containers were pre-rinsed with 5% AR and DI water.

The sampling train was prepared in the lunch room at Thane Developments Ltd. The filter was a teflon mesh type issued to IMET from the MOE especially for this project. Filters were tared on an electronic balance in IMET's lab after conditioning in an oven (100 °C) for 2 hours and a dessicator for 4 hours. The first two impingers each contained 100 mls of DI water with the third empty and the fourth with silica gel.

5.4.2 Particulate Sampling Methodology

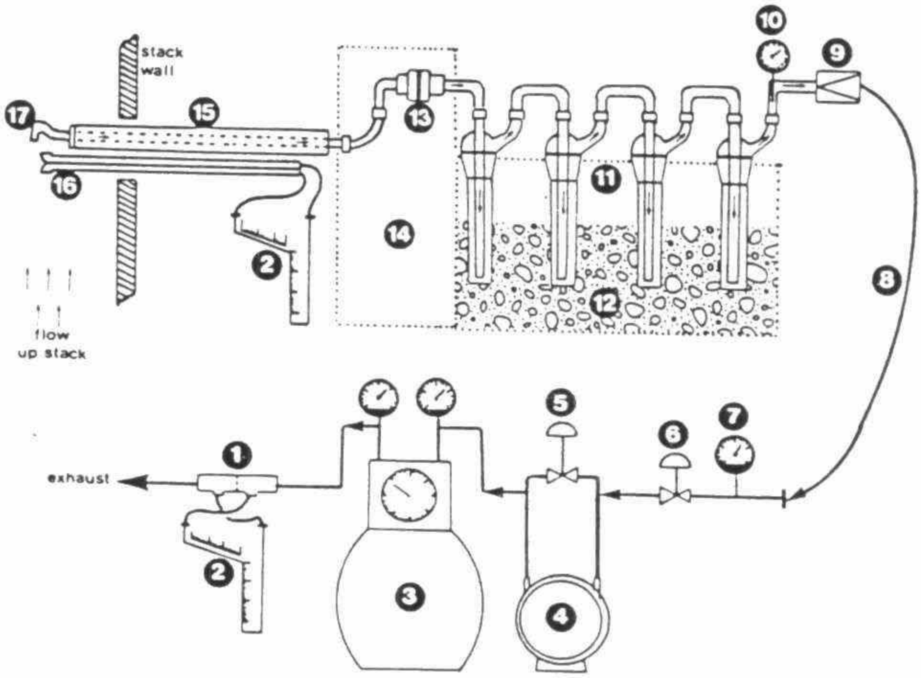
(a) Preliminary velocity, temperature and moisture characteristics were determined.

(b) Isokinetic sampling rates and nozzle sizes were calculated from preliminary data. Nozzle size was selected to allow collection of a maximum amount of sample.

(c) Sampling duration was selected at 60 minutes per traverse to ensure a total duration of 135 minutes which would include one entire cycle of smelting. Sampling was performed during loading, melt down and tapping.

FIGURE 1

Particulate Sampling Train



KEY

① ORIFICE
② MANOMETER
③ DRY TEST METER
④ AIR-TIGHT PUMP
⑤ BY-PASS VALVE
⑥ MAIN VALVE
⑦ VACUUM GAUGE
⑧ VACUUM LINE
⑨ CHECK VALVE
⑩ THERMOMETER
⑪ IMPINGERS
⑫ ICE BATH (ie: COLD BOX)
⑬ FILTER HOLDER
⑭ OVEN (ie: HOT BOX)
⑮ PROBE
⑯ REVERSE-TYPE PITOT
⑰ NOZZLE

NOTES

PARTICULATE

Impinger 1 - distilled water
Impinger 2 - distilled water
Impinger 3 - blank
Impinger 4 - silica gel

(d) Sampling units were vacuum checked in accordance with the Source Testing Code.

(e) Traversing was conducted by the standard method of dividing the cross-section of the stack into equal area zones and sampling at the centroid of each zone for a 5 minute time per point. Sampling rates were adjusted as necessary to maintain a sampling rate within the specified limits of isokinetic deviation (100 + 10 percent) on a point by point basis.

5.4.3 Particulate Sample Recovery and Analysis

After the test period, the sampling train was immediately transferred to the lunch room and disassembled.

The probe and glassware preceeding the filter were brushed and rinsed with DI water and saved. Each impinger was individually weighed both before and after testing to determine moisture gain.

The impingers were rinsed with DI water and the solution was saved. The filter was removed and stored in a petri dish.

After recovery, all samples were issued to MOE personnel on-site to be transferred to the MOE laboratory for analysis.

6.0 RESULTS PRESENTATION

Table 1 contains the particulate testing data summary while Table 2 contains the specific contaminent emission rates and Table 3 contains the process batch compositions.

The baghouse exhaust has an average particulate emission concentration of 79.7 mg/DSm^3 and an average particulate emission rate of 1.63 g/s. The particulate emission rate for tests M28-1 and M29-1 were similar for an average of 26.6 mg/DSm^3, while for test M29-2 the particulate emission rate was 148.2 mg/DSm^3. The only apparent change in process conditions was the batch composition containing material from Company B.

Metals and anion emission rates are summarized in Table 2. All sample fractions (i.e. probe wash,filter and impingers) were analyzed by the MOE laboratory. Anions were analyzed only in the probe wash and in the impingers. The filter was not analyzed for anions because it was fully consumed in the metal analysis. For each test, the filter anion levels were estimated by multiplying the probe wash anion analysis by the filter/probe wash particulate ratio. In applying this correction, a correspondence between anion and particulate fractions was assumed. This adjustment was done upon consultation with the MOE project officer.

Opacity readings were obtained from the plant instrument.

The stack gas flows, temperatures and moistures were similar for all runs. The average stack gas flow was 74,100 DSm^3/hr. The average stack gas temperature was 66.9 deg C and the average stack gas moisture was 1.57%.

The stack gas composition measured 1.0 and 0.5% CO_2 indicating large amounts of dilution air.

ALUMINUM RECOVERY SMELTER
THANE DEVELOPMENTS LTD.
KESWICK, ONTARIO

IMET PROJECT NO. 1218
MAY 28-29, 1986

TABLE 1

PARTICULATE TESTING DATA SUMMARY

EMISSION DATA	UNIT	TEST M28-1	TEST M29-1	TEST M29-2	AVERAGE
Particuate Emission Conc.	mg/DSm^3	29.5	33.2	176.4	79.7
	mg/Am^3	25.1	28.2	148.2	67.2
Particulate Emission Rate	g/s	0.607	0.694	3.582	1.63
Stack Gas Temperature	deg C	64.4	66.4	69.8	66.9
Stack Gas Flow	DSm^3/hr	74,100	75,200	73,100	74,100
	Am^3/hr	87,000	88,600	87,000	87,500
Gas Velocity	m/s	22.17	22.59	22.17	22.31
Gas Moisture	% Vol.	1.66	1.50	1.56	1.57
Total Particulate	g	0.1198	0.1379	0.7111	0.3229
Sampling Time	min	120.0	120.0	120.0	120.0
Sample Volume	DSm^3	4.07	4.15	4.03	4.08
Isokineticity	%	99.1	99.6	99.6	99.4
Opacity	%	ND	3	3	3

TABLE 2

SPECIFIC CONTAMINANT EMISSION RATES

(mg/s)

TEST		COPPER	NICKEL	ZINC	CHROMIUM	LEAD	IRON	MANGANESE	CALCIUM	MAGNESIUM	ALUMINUM
M28-1	Front Wash	.780	1.657	3.022	NR	.487	NR	.702	13.648	3.237	18.913
	Filter	.258	.025	.025	.042	.034	1.413	ND	NR	.273	4.720
	Impinger	.132	ND	ND	NR	ND	NR	ND	.528	ND	.220
	Total	1.17	1.682	3.047	.042	.521	1.413	.702	14.18	3.510	23.853
M29-1	Front Wash	.894	1.301	2.495	NR	.370	NR	.431	8.490	3.367	.806
	Filter	.599	.028	.886	.025	.078	4.103	.042	NR	1.460	15.616
	Impinger	.072	ND	.095	NR	ND	NR	ND	.5499	ND	.787
	Total	1.565	1.329	3.476	.025	.448	4.103	.473	9.040	4.827	17.209
M29-2	Front Wash	.338	1.296	2.360	NR	ND	NR	.449	10.538	3.190	1.537
	Filter	2.518	.080	5.238	.064	.024	5.037	.135	NR	3.475	76.510
	Impinger	.070	ND	.046	NR	ND	NR	ND	.511	ND	.372
	Total	2.926	1.376	7.644	.064	.024	5.037	.584	11.05	6.665	78.419

NOTES:
(1) ND Not detected
(2) NR No analysis available

TABLE 2 (CONTINUED)

SPECIFIC CONTAMINANT EMISSION RATES

(mg/s)

TEST		FLUORIDE (as F)	CHLORIDE (as Cl)	SULPHATE (as SO_4)	NITROGEN NITRATE PLUS NITRATE (as N)	NITROGEN NITRATE (as N)
M28-1	Front Wash	1.75	78.2	16.0	1.95	ND
	Filter (Estimate)	(.93)	(41.4)	(8.5)	(1.03)	(ND)
	Impinger	0.7	163	13.0	13.2	ND
	Total	3.38	283	37.5	16.2	ND
M29-1	Front Wash	2.3	82.0	8.8	ND	.07
	Filter (Estimate)	(1.06)	(37.8)	(4.1)	(ND)	(.03)
	Impinger	0.95	319	ND	4.8	ND
	Total	4.31	439	12.9	4.8	.01
M29-2	Front Wash	2.7	128.8	9.0	ND	ND
	Filter (Estimate)	(.7)	(34.0)	(2.4)	(ND)	(ND)
	Impinger	0.5	29.2	190.9	1.2	ND
	Total	3.9	192.0	202.0	1.2	ND

NOTES:

(1) ( ) Estimated figure as analysis not available

$$\left(\text{e.g. filter } F^- = \text{ front wash } F^- \times \frac{\text{filter particulate}}{\text{front wash particulate}}\right)$$

(2) ND Not detected

TABLE 3

PROCESS DATA

	TEST M28-1				TEST M29-1				TEST M29-2		
	TIME	OPACITY (%)	BAGHOUSE TEMP (^{o}C)		TIME	OPACITY (%)	BAGHOUSE TEMP (^{o}C)		TIME	OPACITY (%)	BAGHOUSE TEMP (^{o}C)
START	0	ND	39	START	0	4	34	START	0	4	66
14:44	6	ND	82	10:29	6	4	72	16:25	19	6	74
	11	ND	86		10	3	69		29	5	70
	20	ND	88		17	2	75		39	6	82
	32	ND	90		34	3	79		51	4	85
	41	ND	100		49	3	93		73	2	106
	62	ND	111		63	3	100		89	2	126
	76	ND	127		74	2	114		97	0	132
	84	ND	133		85	1	121		104	0	147
	97	ND	130		98	4	131		124	0	151
	105	ND	140		122	2	54				
	112	ND	146		136	4	119				
	114	ND	95								
	121	ND	50								
	142	ND	125								

TABLE 4

BATCH COMPOSITION

TEST	MATERIAL SUPPLIER COMPANY	BATCH NUMBER	ALLOY	VISUALLY ESTIMATED QUANTITY
M28-1	A	4	319A	5000 Lb material 800 lb salt flux
M29-1	E	1	380	4500 lb material 1000-1500 lb salt flux
	D	2	380	
	C	5	380	
M29-2	B	3	380	4500 lb material 1000-1500 lb salt flux

APPENDIX 1

PARTICULATE TESTING

COMPUTER OUTPUT

IMET

DEFINITIONS

1) Concentrations at 12% CO_2 - Particulate concentration adjusted to a standard of 12% CO_2. Used for combustion systems.

2) DSm^3 - Standard cubic metres of dry gas at 25 deg C and 101.325 kPa.

3) DSCF - Dry standard cubic feet of dry gas at 77 deg F and 29.92 in. Hg.

4) Am^3 - Actual cubic metres of gas at stack conditions.

5) fpm - feet per minute

6) cfm - cubic feet per minute.

7) Maximum 1/2 hour average concentration at point of impingement - concentration of pollutant at a specified point of impingement as calculated using a Gausion plume model described in Regulation 308.

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INDEPENDENT MEASUREMENT AND TECHNOLOGY INC. PARTICULATE EMISSION REPORT

CLIENT  : THANE DEVELOPMENTS LTD.                  DATE : MAY 28 1986
JOBSITE : KESWICK ONTARIO                          RUN  : M28-1
REF.No. : 1218                                     LOC. : BAGHOUSE EXHAUST

RUN TIME : 16:25 TO 19:00



CONCENTRATION                  29.5 mg/DSm3       0.0129 gr/DScf
                               25.1 mg/Am3        0.0110 gr/Acf


EMISSION RATE                 0.607 g/s             4.82 lb/hr


SAMPLING VOLUME             4.0658 DSm3         143.568 DScf

AVERAGE ISOKINETICITY          99.1 %


FLUE GAS CHARACTERISTICS

MOISTURE                       1.66 %

TEMPERATURE                    64.4 deg C          148.0 deg F

FLOW                          74127 DSm3/hr        43630 DScfm
                              86973 m3/hr          51191 Acfm

VELOCITY                      22.17 m/s           4364.1 fpm

GAS ANALYSIS
                    O2        19.50 %
                    CO2        1.00 %
                    CO         0.00 %
                    MOL. WT.   29.0 g/g MOLE (DRY)


*STANDARD CONDITIONS : METRIC   25 deg C, 101.325 kPa
                       IMPERIAL 77 deg F, 29.92 in. Hg
```

INDEPENDENT MEASUREMENT AND TECHNOLOGY INC. PARTICULATE EMISSION REPORT

CLIENT : THANE DEVELOPMENTS LTD.
JOBSITE : KESWICK ONTARIO
REF.No. : 1218

DATE : MAY 28 1986
RUN : M28-1
LOC. : BAGHOUSE EXHAUST

STACK HEIGHT	15.24 m	50.0 ft.
STACK DIAMETER	1.18 m	46.4 in.
STACK AREA	1.090 m2	11.73 sq.ft.
BAROMETRIC PRESSURE	99.4 kPa	29.36 in.Hg
STATIC PRESSURE	-124.5 Pa	-0.50 in.H20
NOZZLE DIAMETER	6.20 mm	0.2440 in.
PITOT COEFFICIENT	0.806	
METER CORRECTION FACTOR	0.996	

CONDENSATION IN IMPINGER 1	3.4 ml
CONDENSATION IN IMPINGER 2	9.5 ml
CONDENSATION IN IMPINGER 3	4.5 ml
CONDENSATION IN IMPINGER 4	33.1 ml
CONDENSATION IN IMPINGER 5	0.0 ml
TOTAL CONDENSATION	50.5 ml

FILTER PARTICULATE	0.0415 g
WASHINGS PARTICULATE	0.0783 g
IMPINGER PARTICULATE	0.0000 g
TOTAL PARTICULATE	0.1198 g
SAMPLING TIME	120.0 min.

INDEPENDENT MEASUREMENT AND TECHNOLOGY INC. PARTICULATE EMISSION REPORT

CLIENT : THANE DEVELOPMENTS LTD.
JOBSITE : KESWICK ONTARIO
REF.No. : 1218

DATE : MAY 28 1986
RUN : M28-1
LOC. : BAGHOUSE EXHAUST

PT. NO.	TIME min.	STACK TEMP. deg.F	VEL. HEAD in.H20	ORIF. PRESS. in.H20	METER VOL. cu.ft.	METER TEMP. deg.F	OVEN TEMP. deg.F	PROBE TEMP. deg.F	PUMP VAC. in.Hg	WALL DIST. in.	% ISO.
TRAVERSE NO: 1											
1	0.0	107	1.950	5.40	198.31	60	244	221	6.0	1.0	95.2
1	2.5	108	1.950	5.40	201.57	60	245	221	6.0	1.0	99.7
2	5.0	107	1.850	5.00	204.98	60	240	220	5.5	3.1	99.2
2	7.5	106	1.850	5.00	208.29	60	239	221	5.5	3.1	96.4
3	10.0	105	1.550	3.80	211.51	60	240	220	4.5	5.5	95.8
3	12.5	104	1.550	3.80	214.45	60	241	218	4.5	5.5	93.7
4	15.0	103	1.550	3.80	217.33	60	239	215	4.5	8.2	93.6
4	17.5	112	1.550	3.80	220.21	60	240	216	4.5	8.2	95.0
5	20.0	127	1.450	3.70	223.11	60	242	215	4.0	11.6	96.4
5	22.5	133	1.450	3.70	225.92	60	243	217	4.0	11.6	95.9
6	25.0	137	1.550	4.00	228.70	60	243	220	4.5	16.5	96.1
6	27.5	140	1.550	4.00	231.57	60	242	221	4.5	16.5	96.7
7	30.0	144	1.800	4.80	234.45	60	240	221	5.0	29.9	97.7
7	32.5	145	1.800	4.80	237.57	60	238	222	5.0	29.9	99.4
8	35.0	146	1.800	4.80	240.74	60	238	224	5.0	34.8	100.7
8	37.5	147	1.800	4.80	243.95	60	240	226	5.0	34.8	101.1
9	40.0	148	1.750	4.60	247.17	60	238	225	5.0	38.2	99.7
9	42.5	149	1.750	4.60	250.30	60	238	225	5.0	38.2	98.9
10	45.0	150	1.750	4.60	253.40	60	238	225	5.0	40.9	98.0
10	47.5	151	1.750	4.60	256.47	60	240	224	5.0	40.9	98.7
11	50.0	153	1.750	4.60	259.56	60	240	223	5.0	43.3	98.9
11	52.5	155	1.700	4.40	262.65	60	240	224	5.0	43.3	99.1
12	55.0	156	1.700	4.40	265.70	60	238	226	5.0	45.4	98.9
12	57.5	159	1.700	4.40	268.74	60	240	228	5.0	45.4	99.8
	60.0				271.80						
TRAVERSE NO: 2											
1	0.0	182	1.200	3.00	271.91	60	255	250	4.0	1.0	100.4
1	2.5	185	1.200	3.00	274.46	60	258	251	4.0	1.0	100.3
2	5.0	183	1.500	3.80	277.00	60	257	246	5.0	3.1	100.7
2	7.5	183	1.500	3.80	279.85	60	254	244	5.0	3.1	100.7
3	10.0	182	1.500	4.00	282.70	60	252	245	5.0	5.5	102.4
3	12.5	183	1.500	4.00	285.60	60	250	242	5.0	5.5	102.8
4	15.0	184	1.450	3.80	288.51	60	249	242	5.0	8.2	102.8

INDEPENDENT MEASUREMENT AND TECHNOLOGY INC. PARTICULATE EMISSION REPORT

CLIENT : THANE DEVELOPMENTS LTD.
JOBSITE : KESWICK ONTARIO
REF.No. : 1218

DATE : MAY 28 1986
RUN : M28-1
LOC. : BAGHOUSE EXHAUST

PT. NO.	TIME min.	STACK TEMP. deg.F	VEL. HEAD in.H20	ORIF. PRESS. in.H20	METER VOL. cu.ft.	METER TEMP. deg.F	OVEN TEMP. deg.F	PROBE TEMP. deg.F	PUMP VAC. in.Hg	WALL DIST. in.	% ISO.
4	17.5	185	1.450	3.80	291.37	60	248	240	5.0	8.2	102.5
5	20.0	187	1.350	3.60	294.22	60	252	241	5.0	11.6	102.7
5	22.5	185	1.350	3.60	296.97	60	252	240	5.0	11.6	102.5
6	25.0	188	1.400	3.70	299.72	60	253	241	5.0	16.5	102.7
6	27.5	190	1.400	3.70	302.52	60	254	241	5.0	16.5	105.1
7	30.0	191	1.450	3.80	305.38	60	255	246	5.0	29.9	104.8
7	32.5	193	1.450	3.80	308.28	60	258	250	5.0	29.9	102.1
8	35.0	166	1.500	4.00	311.10	60	258	247	5.0	34.8	101.1
8	37.5	151	1.500	4.00	314.00	60	254	242	5.0	34.8	99.2
9	40.0	136	1.450	3.80	316.88	60	252	242	5.0	38.2	98.6
9	42.5	133	1.450	3.80	319.73	60	250	241	5.0	38.2	97.3
10	45.0	128	1.400	3.70	322.55	60	254	244	5.0	40.9	97.2
10	47.5	125	1.400	3.70	325.33	60	258	248	5.0	40.9	96.9
11	50.0	122	1.400	3.70	328.11	60	259	250	5.0	43.3	97.0
11	52.5	119	1.400	3.70	330.90	60	260	253	5.0	43.3	97.1
12	55.0	116	1.400	3.70	333.70	60	258	254	5.0	45.4	95.5
12	57.5	115	1.400	3.70	336.46	60	258	254	5.0	45.4	95.7
	60.0				339.23						
AVERAGE		148	1.554	4.07							99.1

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INDEPENDENT MEASUREMENT AND TECHNOLOGY INC. PARTICULATE EMISSION REPORT

CLIENT  : THANE DEVELOPMENTS LTD.                DATE : MAY 29 1986
JOBSITE : KESWICK ONTARIO                        RUN  : M29-1
REF.No. : 1218                                   LOC. : BAGHOUSE EXHAUST

RUN TIME : 10:29 TO 12:52



CONCENTRATION                    33.2 mg/DSm3       0.0145 gr/DScf
                                 28.2 mg/Am3        0.0123 gr/Acf


EMISSION RATE                   0.694 g/s             5.51 lb/hr


SAMPLING VOLUME               4.1478 DSm3         146.461 DScf

AVERAGE ISOKINETICITY            99.6 %


FLUE GAS CHARACTERISTICS

MOISTURE                         1.50 %

TEMPERATURE                      66.4 deg C         151.5 deg F

FLOW                            75173 DSm3/hr       44246 DScfm
                                88616 m3/hr         52158 Acfm

VELOCITY                        22.59 m/s          4446.5 fpm

GAS ANALYSIS
                    O2          20.00 %
                    CO2          0.50 %
                    CO           0.00 %
                    MOL. WT.     28.9 g/g MOLE (DRY)



*STANDARD CONDITIONS : METRIC   25 deg C, 101.325 kPa
                       IMPERIAL 77 deg F, 29.92 in. Hg
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INDEPENDENT MEASUREMENT AND TECHNOLOGY INC. PARTICULATE EMISSION REPORT

CLIENT : THANE DEVELOPMENTS LTD.
JOBSITE : KESWICK ONTARIO
REF.No. : 1218

DATE : MAY 29 1986
RUN : M29-1
LOC. : BAGHOUSE EXHAUST

STACK HEIGHT	15.24 m	50.0 ft.
STACK DIAMETER	1.18 m	46.4 in.
STACK AREA	1.090 m2	11.73 sq.ft.
BAROMETRIC PRESSURE	99.4 kPa	29.34 in.Hg
STATIC PRESSURE	-124.5 Pa	-0.50 in.H20
NOZZLE DIAMETER	6.20 mm	0.2440 in.
PITOT COEFFICIENT	0.806	
METER CORRECTION FACTOR	0.996	

CONDENSATION IN IMPINGER 1	-1.0 ml
CONDENSATION IN IMPINGER 2	6.9 ml
CONDENSATION IN IMPINGER 3	6.3 ml
CONDENSATION IN IMPINGER 4	34.2 ml
CONDENSATION IN IMPINGER 5	0.0 ml
TOTAL CONDENSATION	46.4 ml

FILTER PARTICULATE	0.0435 g
WASHINGS PARTICULATE	0.0944 g
IMPINGER PARTICULATE	0.0000 g
TOTAL PARTICULATE	0.1379 g
SAMPLING TIME	120.0 min.

INDEPENDENT MEASUREMENT AND TECHNOLOGY INC. PARTICULATE EMISSION REPORT

CLIENT : THANE DEVELOPMENTS LTD.
JOBSITE : KESWICK ONTARIO
REF.No. : 1218

DATE : MAY 29 1986
RUN : M29-1
LOC. : BAGHOUSE EXHAUST

PT. NO.	TIME min.	STACK TEMP. deg.F	VEL. HEAD in.H20	ORIF. PRESS. in.H20	METER VOL. cu.ft.	METER TEMP. deg.F	OVEN TEMP. deg.F	PROBE TEMP. deg.F	PUMP VAC. in.Hg	WALL DIST. in.	% ISO.
TRAVERSE NO: 1											
1	0.0	107	1.750	4.60	339.50	60	242	238	5.5	1.0	95.7
1	2.5	116	1.750	4.60	342.62	60	242	238	5.5	1.0	96.8
2	5.0	123	1.900	5.00	345.75	60	238	236	6.0	3.1	97.7
2	7.5	124	1.900	5.00	349.02	60	238	236	6.0	3.1	97.8
3	10.0	127	1.700	4.40	352.29	60	236	236	5.5	5.5	99.1
3	12.5	128	1.700	4.40	355.42	60	237	234	5.5	5.5	97.6
4	15.0	131	1.550	4.10	358.50	60	237	231	5.5	8.2	98.4
4	17.5	133	1.550	4.10	361.46	60	244	234	5.0	8.2	99.6
5	20.0	134	1.450	3.80	364.45	60	243	234	4.5	11.6	99.2
5	22.5	134	1.450	3.80	367.33	60	245	233	4.5	11.6	98.1
6	25.0	136	1.500	4.00	370.18	60	243	234	5.0	16.5	98.4
6	27.5	136	1.500	4.00	373.08	60	244	231	5.0	16.5	98.7
7	30.0	138	2.000	5.60	375.99	60	243	232	6.5	29.9	98.7
7	32.5	138	2.000	5.60	379.33	60	241	232	6.5	29.9	100.5
8	35.0	139	1.950	5.40	382.73	60	246	233	6.5	34.8	100.6
8	37.5	140	1.950	5.40	386.09	60	252	234	6.5	34.8	101.0
9	40.0	147	1.900	5.00	389.46	60	244	231	6.0	38.2	99.4
9	42.5	148	1.900	5.00	392.72	60	242	232	6.0	38.2	99.2
10	45.0	151	1.750	4.60	395.97	60	238	233	5.5	40.9	99.7
10	47.5	152	1.750	4.60	399.10	60	238	232	5.5	40.9	99.8
11	50.0	152	1.700	4.40	402.23	60	241	234	5.5	43.3	99.6
11	52.5	153	1.700	4.40	405.31	60	241	236	5.5	43.3	98.7
12	55.0	156	1.650	4.20	408.36	60	253	238	5.5	45.4	100.0
12	57.5	159	1.650	4.20	411.40	60	250	238	5.5	45.4	99.6
	60.0				414.42						
TRAVERSE NO: 2											
1	0.0	175	1.350	3.60	414.52	60	242	236	4.5	1.0	101.4
1	2.5	176	1.350	3.60	417.27	60	242	236	4.5	1.0	100.8
2	5.0	178	1.500	4.00	420.00	60	241	236	5.0	3.1	100.1
2	7.5	180	1.500	4.00	422.85	60	242	238	5.0	3.1	101.3
3	10.0	183	1.450	3.80	425.73	60	243	238	5.0	5.5	100.7
3	12.5	184	1.450	3.80	428.54	60	244	238	5.0	5.5	101.5
4	15.0	185	1.400	3.70	431.37	60	241	235	5.0	8.2	102.6

INDEPENDENT MEASUREMENT AND TECHNOLOGY INC. PARTICULATE EMISSION REPORT

CLIENT : THANE DEVELOPMENTS LTD.
JOBSITE : KESWICK ONTARIO
REF.No. : 1218

DATE : MAY 29 1986
RUN : M29-1
LOC. : BAGHOUSE EXHAUST

PT. NO.	TIME min.	STACK TEMP. deg.F	VEL. HEAD in.H20	ORIF. PRESS. in.H20	METER VOL. cu.ft.	METER TEMP. deg.F	OVEN TEMP. deg.F	PROBE TEMP. deg.F	PUMP VAC. in.Hg	WALL DIST. in.	% ISO.
4	17.5	185	1.400	3.70	434.18	60	247	236	5.0	8.2	102.2
5	20.0	189	1.350	3.60	436.98	60	254	241	5.0	11.6	102.5
5	22.5	188	1.350	3.60	439.73	60	257	244	5.0	11.6	102.5
6	25.0	188	1.400	3.70	442.48	60	256	250	5.0	16.5	101.4
6	27.5	188	1.400	3.70	445.25	60	258	251	5.0	16.5	102.5
7	30.0	183	1.500	4.00	448.05	60	259	250	5.0	29.9	102.2
7	32.5	158	1.500	4.00	450.95	60	252	247	5.0	29.9	100.2
8	35.0	140	1.650	4.20	453.85	60	249	238	5.5	34.8	97.8
8	37.5	132	1.650	4.20	456.86	60	249	238	5.5	34.8	97.4
9	40.0	124	1.650	4.20	459.88	60	248	237	5.5	38.2	97.4
9	42.5	123	1.650	4.20	462.92	60	244	236	5.5	38.2	97.0
10	45.0	145	1.600	4.10	465.95	60	245	236	5.5	40.9	99.0
10	47.5	153	1.600	4.10	468.94	60	244	237	5.5	40.9	99.6
11	50.0	159	1.450	3.80	471.93	60	244	237	5.0	43.3	100.2
11	52.5	165	1.450	3.80	474.78	60	246	238	5.0	43.3	100.7
12	55.0	152	1.450	3.80	477.63	60	248	240	5.0	45.4	99.6
12	57.5	135	1.450	3.80	480.48	60	248	240	5.0	45.4	96.8
	60.0				483.29						
AVERAGE		151	1.601	4.22							99.6

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INDEPENDENT MEASUREMENT AND TECHNOLOGY INC. PARTICULATE EMISSION REPORT

CLIENT   : THANE DEVELOPMENTS LTD.                DATE : MAY 29 1986
JOBSITE : KESWICK ONTARIO                         RUN  : M29-2
REF.No. : 1218                                    LOC. : BAGHOUSE EXHAUST

RUN TIME : 14:44 TO 17:01



CONCENTRATION                  176.4 mg/DSm3       0.0771 gr/DScf
                               148.2 mg/Am3        0.0648 gr/Acf


EMISSION RATE                  3.582 g/s            28.43 lb/hr


SAMPLING VOLUME              4.0310 DSm3        142.336 DScf

AVERAGE ISOKINETICITY          99.6 %


FLUE GAS CHARACTERISTICS

MOISTURE                       1.56 %

TEMPERATURE                    69.8 deg C          157.6 deg F

FLOW                          73093 DSm3/hr        43021 DScfm
                              86990 m3/hr          51200 Acfm

VELOCITY                      22.17 m/s           4364.9 fpm

GAS ANALYSIS
                    O2        20.00 %
                    CO2        0.50 %
                    CO         0.00 %
                    MOL. WT.   28.9 g/g MOLE (DRY)


*STANDARD CONDITIONS : METRIC   25 deg C, 101.325 kPa
                       IMPERIAL 77 deg F, 29.92 in. Hg
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INDEPENDENT MEASUREMENT AND TECHNOLOGY INC. PARTICULATE EMISSION REPORT

CLIENT : THANE DEVELOPMENTS LTD.
JOBSITE : KESWICK ONTARIO
REF.No. : 1218

DATE : MAY 29 1986
RUN : M29-2
LOC. : BAGHOUSE EXHAUST

STACK HEIGHT	15.24 m	50.0 ft.
STACK DIAMETER	1.18 m	46.4 in.
STACK AREA	1.090 m2	11.73 sq.ft.
BAROMETRIC PRESSURE	99.5 kPa	29.37 in.Hg
STATIC PRESSURE	-124.5 Pa	-0.50 in.H20
NOZZLE DIAMETER	6.20 mm	0.2440 in.
PITOT COEFFICIENT	0.806	
METER CORRECTION FACTOR	0.996	

CONDENSATION IN IMPINGER 1	3.9 ml
CONDENSATION IN IMPINGER 2	8.6 ml
CONDENSATION IN IMPINGER 3	1.2 ml
CONDENSATION IN IMPINGER 4	33.2 ml
CONDENSATION IN IMPINGER 5	0.0 ml
TOTAL CONDENSATION	46.9 ml

FILTER PARTICULATE	0.1484 g
WASHINGS PARTICULATE	0.5627 g
IMPINGER PARTICULATE	0.0000 g
TOTAL PARTICULATE	0.7111 g
SAMPLING TIME	120.0 min.

INDEPENDENT MEASUREMENT AND TECHNOLOGY INC. PARTICULATE EMISSION REPORT

CLIENT : THANE DEVELOPMENTS LTD.
JOBSITE : KESWICK ONTARIO
REF.No. : 1218

DATE : MAY 29 1986
RUN : M29-2
LOC. : BAGHOUSE EXHAUST

PT. NO.	TIME min.	STACK TEMP. deg.F	VEL. HEAD in.H20	ORIF. PRESS. in.H20	METER VOL. cu.ft.	METER TEMP. deg.F	OVEN TEMP. deg.F	PROBE TEMP. deg.F	PUMP VAC. in.Hg	WALL DIST. in.	% ISO.
TRAVERSE NO: 1											
1	0.0	117	1.900	5.00	483.55	60	234	228	5.0	1.0	95.0
1	2.5	121	1.900	5.00	486.74	60	233	228	5.0	1.0	97.4
2	5.0	124	1.850	4.80	490.00	60	236	230	5.0	3.1	96.5
2	7.5	125	1.850	4.80	493.18	60	236	230	5.0	3.1	96.9
3	10.0	126	1.700	4.40	496.37	60	237	228	5.0	5.5	96.9
3	12.5	127	1.700	4.40	499.43	60	234	230	5.0	5.5	97.6
4	15.0	128	1.500	4.00	502.51	60	233	230	5.0	8.2	97.8
4	17.5	127	1.500	4.00	505.41	60	233	228	5.0	8.2	98.4
5	20.0	128	1.400	3.70	508.33	60	234	229	4.0	11.6	97.7
5	22.5	128	1.400	3.70	511.13	60	235	227	4.0	11.6	97.7
6	25.0	129	1.400	3.70	513.93	60	236	228	4.0	16.5	96.7
6	27.5	130	1.400	3.70	516.70	60	241	232	4.0	16.5	96.1
7	30.0	131	1.900	5.00	519.45	60	241	232	5.5	29.9	96.4
7	32.5	130	1.900	5.00	522.65	60	242	234	5.5	29.9	98.1
8	35.0	132	1.850	4.90	525.91	60	244	236	5.5	34.8	98.4
8	37.5	136	1.850	4.90	529.13	60	242	238	5.5	34.8	97.8
9	40.0	139	1.750	4.60	532.32	60	241	238	5.0	38.2	98.8
9	42.5	141	1.750	4.60	535.45	60	241	238	5.0	38.2	98.0
10	45.0	141	1.700	4.40	538.55	60	246	237	5.0	40.9	98.8
10	47.5	142	1.700	4.40	541.63	60	246	236	5.0	40.9	99.2
11	50.0	144	1.700	4.40	544.72	60	246	239	5.0	43.3	100.6
11	52.5	144	1.700	4.40	547.85	60	245	238	5.0	43.3	99.7
12	55.0	147	1.650	4.20	550.95	60	244	238	5.0	45.4	98.7
12	57.5	148	1.650	4.20	553.97	60	244	238	5.0	45.4	97.5
	60.0				556.95						
TRAVERSE NO: 2											
1	0.0	168	1.200	3.20	557.05	60	259	248	3.5	1.0	98.4
1	2.5	169	1.200	3.20	559.58	60	254	246	3.5	1.0	99.3
2	5.0	173	1.350	3.60	562.13	60	250	242	4.5	3.1	99.9
2	7.5	174	1.350	3.60	564.84	60	246	242	4.5	3.1	101.4
3	10.0	176	1.350	3.60	567.59	60	250	241	4.5	5.5	101.6
3	12.5	177	1.350	3.60	570.34	60	250	242	4.5	5.5	101.7
4	15.0	179	1.350	3.60	573.09	60	251	241	4.5	8.2	101.8

INDEPENDENT MEASUREMENT AND TECHNOLOGY INC. PARTICULATE EMISSION REPORT

CLIENT : THANE DEVELOPMENTS LTD.
JOBSITE : KESWICK ONTARIO
REF.No. : 1218

DATE : MAY 29 1986
RUN : M29-2
LOC. : BAGHOUSE EXHAUST

PT. NO.	TIME min.	STACK TEMP. deg.F	VEL. HEAD in.H20	ORIF. PRESS. in.H20	METER VOL. cu.ft.	METER TEMP. deg.F	OVEN TEMP. deg.F	PROBE TEMP. deg.F	PUMP VAC. in.Hg	WALL DIST. in.	% ISO.
4	17.5	181	1.350	3.60	575.84	60	247	241	4.5	8.2	101.3
5	20.0	185	1.300	3.40	578.57	60	245	241	4.5	11.6	101.2
5	22.5	186	1.300	3.40	581.24	60	245	240	4.5	11.6	102.4
6	25.0	185	1.350	3.60	583.94	60	244	240	4.5	16.5	100.5
6	27.5	187	1.350	3.60	586.64	60	251	238	4.5	16.5	102.1
7	30.0	188	1.500	4.00	589.38	60	261	242	5.0	29.9	102.0
7	32.5	190	1.500	4.00	592.26	60	255	243	5.0	29.9	102.9
8	35.0	193	1.550	4.10	595.16	60	258	244	5.0	34.8	102.1
8	37.5	194	1.550	4.10	598.08	60	258	244	5.0	34.8	102.6
9	40.0	195	1.450	3.80	601.01	60	259	245	5.0	38.2	102.1
9	42.5	196	1.450	3.80	603.83	60	259	245	5.0	38.2	101.8
10	45.0	198	1.450	3.80	606.64	60	260	241	5.0	40.9	104.8
10	47.5	197	1.450	3.80	609.53	60	255	240	5.0	40.9	101.5
11	50.0	200	1.300	3.40	612.33	60	252	238	4.5	43.3	103.5
11	52.5	182	1.300	3.40	615.03	60	252	244	4.5	43.3	101.0
12	55.0	158	1.400	3.70	617.70	60	251	244	5.0	45.4	100.2
12	57.5	148	1.400	3.70	620.50	60	251	242	5.0	45.4	96.5
	60.0				623.22						
AVERAGE		158	1.529	4.02							99.6

APPENDIX 2

SAMPLE ANALYSIS

ALUMINUM RECOVERY SMELTER
THANE DEVELOPMENTS LTD.
KESWICK, ONTARIO

IMET PROJECT NO. 1268
May 28-29, 1986

SAMPLE ANALYSIS SCHEDULE

FIELD NO.	SAMPLE DESCRIPTION	TEST
700	Probe Pre-rinse	M28-1
701	Pretest Rinse	M28-1
702	Front Wash	M28-1
703	Impinger Solution	M28-1
704	Filter	M28-1
705	Pre-test Rinse	M29-1
706	Front Wash	M29-1
707	Front Wash	M29-1
708	Impinger Solution	M29-1
709	Filter	M29-1
710	Pre-rinse Glassware	M29-2
711	Front Wash	M29-2
712	Front Wash	M29-2
713	Impinger Solution	M29-2
714	Filter	M29-2
715	DI Water Blank	M29-2
716	Filter Blank	
717	Baghouse Dust	M28-1
718	#4 Source Batch	M28-1
719	Salt Flux	M28-1 M29-1 M29-2

Cont'd.

IMET

SAMPLE ANALYSIS SCHEDULE (CONTINUED)

FIELD NO.	SAMPLE DESCRIPTION	TEST
720	Composite Batch #1	M29-1
721	Composite Batch #5	M29-1
722	Composite Batch #2	M29-1
723	Baghouse Dust Composite Batch #5, #2, #1	M29-1
724	Source Batch #3	M29-2
725	Baghouse Dust Batch #3	M29-2

ALUMINUM RECOVERY SMELTER
THANE DEVELOPMENTS LTD.
KESWICK, ONTARIO

IMET PROJECT NO: 1268
MAY 1986

SAMPLE ANALYSIS*

FIELD NO.	DESCRIPTION	TOTAL PARTICULATE (g)	TOTAL VOLUME (ml)
702	28-1 FRONT WASH	.0783	385
703	28-1 IMPINGER SOLUTION	NA	434
706	29-1 FRONT WASH	.0195	160
707	29-1 FRONT WASH	.0749	136
708	29-1 IMPINGER SOLUTION	NA	474
711	29-2 FRONT WASH	.1127	446
712	29-2 FRONT WASH	.4500	180
713	29-2 IMPINGER SOLUTION	NA	461

* ANALYSIS BY MOE, LABORATORY SERVICES BRANCH
RELAYED BY TELEPHONE

Ministry
of the
Environment

Ministère
de
l'Environnement

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125 Resources Road
Rexdale, Ontario
M9W 5L1
Tel. No. 248-3346

CERTIFICATE OF ANALYSIS

Issued to: Ron Brooks **Region:** Central

Lab Sample #: CC22-0065/0090 **Location:** Toronto

Reported Location of Sampling: Thane Development, Keswick

Reported Date of Sampling: May 29, 1986

Submitted by: Ron Brooks

NOTE:

Each sample of material, the analysis of which is the subject of this certificate, was received by Clifford Lee on the 30th day of May, 1986, in a sealed container, bearing seal # shown below, and was submitted by Ron Brooks indicating that it was collected at the time and place shown on the LIS Request for Analysis Form opposite to the laboratory number assigned to it.

An analysis was performed on the samples, using standard techniques and the results shown herein were obtained.

Lab#	Field #	Seal #
CC22-0065	700	LS18251
CC22-0066	701	LS18252
CC22-0067	702	LS18253
CC22-0068	703	LS18254
CC22-0069	704	LS18255
CC22-0070	705	LS18256
CC22-0071	706	LS18257
CC22-0072	707	LS18258
CC22-0073	708	LS18259
CC22-0074	709	LS18260
CC22-0075	710	LS18261
CC22-0076	711	LS18262
CC22-0077	712	LS18263

Certified at Toronto this 10th day of July, 1986.

W.B. Moody III
Provincial Analyst
Ontario Ministry of the Environment

Ministry of the Environment
Ministère de l'Environnement

Laboratory Services Branch
125 Resources Road
Rexdale, Ontario
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CERTIFICATE OF ANALYSIS

Sample No: CC22-0065 to CC22-0090

Sample No s CC22-0065 to CC22-0068, CC65-0070 to CC22-0073, Cc22-0075 to CC22-0078 and CC22-0080 were probe washings and impinger solutions. These were treated with an acid mixture and the solutions analyzed by spectroscopic techniques.

Results in (mg/L)

	Cu	Ni	Zn	Pb	Mn	Al	Ca	Mg
CC22-0065	ND	0.20	0.06	ND	0.12	0.07	1.96	0.27
CC22-0066	0.04	ND	ND	ND	ND	ND	ND	ND
CC22-0067	0.40	0.85	1.55	0.25	0.36	9.70	7.00	1.66
CC22-0068	0.06	ND	ND	ND	ND	0.10	0.24	ND
CC22-0070	0.02	0.43	0.15	ND	0.14	0.25	1.98	ND
CC22-0071	0.04	ND	0.25	ND	ND	0.72	1.19	0.78
CC22-0072	1.26	1.90	3.35	0.54	0.63	0.33	11.00	4.00
CC22-0073	0.03	ND	0.04	ND	ND	0.33	0.23	ND
CC22-0075	ND	ND	ND	ND	ND	0.08	0.37	ND
CC22-0076	0.11	0.46	0.99	ND	0.20	0.20	4.15	1.42
CC22-0077	0.10	0.29	0.15	ND	ND	1.20	1.34	ND
CC22-0078	0.03	ND	0.02	ND	ND	0.16	0.22	ND
CC22-0080	0.02	ND	ND	ND	ND	ND	0.26	ND

ND - not detected

Certified at Toronto this 9th day of July, 1986.

Pimenta

Dr. J.A. Pimenta
Provincial Analyst
Ontario Ministry of the Environment

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CERTIFICATE OF ANALYSIS

Samples CC22-0082 to CC22-0090 were solid samples. These samples, with the exception of CC22-0084 contained aluminum metal and were treated with sodium hydroxide to dissolve the aluminum. The insoluble hydroxides were dissolved in aqua regia. Sample CC22-0084 consisted of common salt and was dissolved in distilled water. The above solutions were analyzed using spectroscopic techniques.

Results (in $\mu g/g$)

	Cu	Ni	Zn	Cr	Pb	Fe	Mn	Ca	Mg
CC22-0082	5400	140	2400	180	230	21000	590	6600	7500
CC22-0083	24000	100	200	84	43	4700	1000	1900	2800
CC22-0084	1200	3.0	160	6.1	11	270	19	29000	8200
CC22-0085	1200	31	100	37	20	1100	110	360	2100
CC22-0086	21000	210	3200	560	240	23000	1700	12000	3800
CC22-0087	19000	250	950	320	250	3600	1200	440	360
CC22-0088	4800	130	2400	180	210	5200	470	8100	14000
CC22-0089	11100	260	2300	270	200	14000	750	10000	6100
CC22-0090	6900	270	3900	280	260	7900	740	5600	9000

Certified at Toronto, this 9th day of July, 1986.

Dr. J.A. Pimenta
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CERTIFICATE OF ANALYSIS

Sample CC22-0081 was a clean unexposed teflon filter and samples CC22-0069, CC22-0074 and CC22-0079 were exposed filters of the same material as the blank. These were analyzed after aqua regia acid digestion by using spectroscopic techniques. The filter dust loading was determined using an analytical balance.

Results in (ug/filter)

	Loading	Cu	Ni	Zn	Cr	Pb	Fe	Mn	Mg	Al
CC22-0069	41500	51	5.0	5.0	8.3	6.7	279	ND	54	932
CC22-0074	43500	119	5.6	176	5.0	15.5	815	8.3	290	3102
CC22-0079	148400	500	15.8	1040	12.8	48	1000	26.8	690	15190
CC22-0081	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

Certified at Toronto, this 9th day of July, 1986.

Dr. A.B. Foster
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CERTIFICATE OF ANALYSIS

Lab #	Field #	Seal#
CC22-0078	713	LS18264
CC22-0079	714	LS18265
CC22-0080	715	LS18266
CC22-0081	716	LS18267
CC22-0082	717	LS18268
CC22-0083	718	LS18269
CC22-0084	719	LS18270
CC22-0085	720	LS18271
CC22-0086	721	LS18272
CC22-0087	722	LS18273
CC22-0088	723	LS18274
CC22-0089	724	LS18275
CC22-0090	725	LS18276

Certified at Toronto, this 10th day of July, 1986.

W.B. Moody III
Provincial Analyst
Ontario Ministry of the Environment

MINISTRY OF THE ENVIRONMENT

LABORATORY SERVICES BRANCH - WATER QUALITY SECTION

CERTIFICATE OF ANALYSIS

Samples bearing laboratory sample numbers CC22-0085 to CC22-0090 inclusive, Submission CE03531 dated the 30th day of May, 1986 were analyzed in accordance with procedures published in the HANDBOOK OF ANALYTICAL METHODS FOR ENVIRONMENTAL SAMPLES (Ontario Ministry of the Environment: December, 1983).

Laboratory Sample Number	Chloride, mg/L as Cl	Sulphate, mg/L as SO_4	Nitrogen: Nitrate plus Nitrite, mg/L as N	Nitrogen: Nitrite, mg/L as N	Fluoride, mg/L as F
CC22-0085	2690.	64.1	.25 <W	.05 <T	99. ± 1.0
CC22-0086	395.	43.9	.25 <W	.125 <T	18. ± 0.1
CC22-0087	7.85	0.05 <W	.25 <W	.025 <W	1.39
CC22-0088	18900.	1495.	1.25 <T	.4	72. ±0.5
CC22-0089	!IS	57.5	.25 <W	.075 <T	21.2 ±0.2
CC22-0090	13200.	686. *	.75 <T	.93	26. ±0.2

*	Approximate results. Interference suspected
<W	"Zero value reported is minimum measurable amount.
<T	This low measurement is tentative. For information only.
!IS	No data. Insufficient Sample.

Dated at Toronto this 25th day of August, 1986

F. Tomassini
Provincial Analyst
Ontario Ministry of the Environment

MINISTRY OF THE ENVIRONMENT

LABORATORY SERVICES BRANCH - WATER QUALITY SECTION

CERTIFICATE OF ANALYSIS

Samples bearing laboratory sample numbers CC22-0075 to CC22-0078, CC22-0080 and CC22-0082 to CC22-0084 inclusive, Submission CE03531 dated the 30th day of May, 1986 were analyzed in accordance with procedures published in the **HANDBOOK OF ANALYTICAL METHODS FOR ENVIRONMENTAL SAMPLES** (Ontario Ministry of the Environment: December, 1983).

Laboratory Sample Number	**Chloride, mg/L as Cl**	**Sulphate, mg/L as SO_4**	**Nitrogen: Nitrate plus Nitrite, mg/L as N**	**Nitrogen: Nitrite, mg/L as N**	**Fluoride, mg/L as F**
CC22-0075	2.2	0.05 <W*	0.5 <W	.05 <W	0.1 <T
CC22-0076	55.9	=4.0*	0.5 <W	.05 <T	0.9
CC22-0077	3.9	0.05 <W*	1.25 <W	.125<W	0.8 <T
CC22-0078	12.6	82.3	0.5 <T	.05 <W	0.2 <T
CC22-0080	1.1	0.05 <W*	1.25 <W	.125<T	0.3 <T
CC22-0082	26000.	1410.	1.5	.3	12.8 ±0.2
CC22-0083	1450.	9.1	.25 <T	.05 <T	.98 ±0.02
CC22-0084	53700.	157.	.25 <T	.025<T	1.5 ±0.5

* Samples run on diluted aliquots.
<W "Zero value reported is minimum measurable amount.
<T This low measurement is tentative. For information only.

Dated at Toronto this 25th day of August, 1986

F. Tomassini

F. Tomassini
Provincial Analyst

MINISTRY OF THE ENVIRONMENT

LABORATORY SERVICES BRANCH - WATER QUALITY SECTION

CERTIFICATE OF ANALYSIS

Samples bearing laboratory sample numbers CC22-0065 to CC22-0068 CC22-0070 to CC22-0073 **inclusive, Submission** CE03531 dated the 30th day of May, 1986 were analyzed in accordance with procedures published in the **HANDBOOK OF ANALYTICAL METHODS FOR ENVIRONMENTAL SAMPLES** (Ontario Ministry of the Environment: December, 1983).

Laboratory Sample Number	Chloride, mg/L as Cl	Sulphate, mg/L as SO_4	Nitrogen: Nitrate plus Nitrite, mg/L as N	Nitrogen: Nitrite, mg/L as N	Fluoride, mg/L as F
CC22-0065	3.2	-1.0*	0.5 <W	0.05 <W	0.1 <T
CC22-0066	2060.	1570.	344.	0.05 <W	0.3 <T
CC22-0067	44.7	8.2	1. <T	0.05 <W	0.9 <
CC22-0068	74.1	5.9	6.	0.05 <W	0.3 <T
CC22-0070	6.2	-1.0 *	0.5 <W	0.05 <W	0.2 <T
CC22-0071	23.	-4.0 *	0.5 <W	0.05 <T	0.7
CC22-0072	92.8	8.2 *	0.5 <W	0.05 <T	2.5
CC22-0073	134.	0.05 <W*	2. <T	0.05 <W	0.4

* Samples run on diluted aliquots.
<W "Zero value reported is minimum measurable amount.
<T This low measurement is tentative. For information only.

Dated at Toronto this 25th day of August, 1986

F. Tomassini

F. Tomassini
Provincial Analyst

APPENDIX 3

PRODUCT AND PROCESS SPECIFICATIONS

IMET

EQUIPMENT SPECIFICATIONS

BAGHOUSE

Manufacturer:	Wheelabrator
Type:	Shaker
Model:	126-D, 66-B
No. of Compartments:	6
Bagcleaning:	Continuous, mechanical shaking
No. of compartments on cleanup at the time:	1
Hopper Type:	Pyramidal
No. of Bags:	1650
Bag Size:	5" Diameter, 10' long
Bag Material:	60% of bags of Nomex 1, balance polyester
Gross Cloth Area:	21,675 ft^2
Net Cloth Area:	18,144 ft^2
Designed Air Flow:	42,000 acfm at 275° F Max.
Filtering Velocity:	231 fpm, Max
Dust Removal:	Continuous by (2) screw conveyors
Airlock:	Two rotary valves

FAN

Manufacturer:	Joy Manufacturing
Type:	Centrifugal
Wheel:	Airfoil
Motor:	125 hp, 575/3/60, TEFC
Performance:	42,000 acfm at 12" W.C. at 60°F and 14.7 psia

IMET

STACK

Diameter:	45" ID
Height, above the fan:	30'
Height, above the grade:	(≈46')
Material of Construction:	1/4" m.s.
Ventilation:	

HOOD

Type:	Canopy, closed on two sides
Takeoffs:	one 48", one 24" dia
Material of Construction:	Top of 1/4" mild steel, Sides of various plates
Inlet Air Velocity through the Doors:	120 acfm

IMET

FURNACE SPECIFICATIONS

CAPACITY:

85 cu.ft. charge (Dross and Flux)

Maximum operating temperature - 2200°F (1200°C)

BURNER RATING

Maximum firing rate - 12,000,000 BTUH
Normal firing rate - 8,000,000 BTUH
Pilot burner - 130,000 BTUH

For pressure settings at firing rates refer to the Combustion Piping Schematic, Drawing No. D-8919.

DRUM SPEED

DRUM SPEED - 18 RPM

UTILITIES REQUIRED

No. 2 fuel oil supply - 3 USGPM at 50 to 80 psig
Propane Supply - 52 SCFH @ 5 to 10 psig
Electrical - 575V, 3 PH, 60 Hz. 100 FLA

60-1
30-1

HYDRAULIC SYSTEM

Type of fluid - Phosphate Ester (Houghtosafe 1120 or equal).

FURNACE ROTATING DRIVE

Electric motor - 40 HP, 1800 RPM
Pump - Variable displacement piston type
Hydraulic Motor - 32 HP fixed displacement piston type
Maximum operating pressure - 2000 psig

TILT AND BURNER STAND CYLINDERS

Electric motor - 5 HP, 1800 RPM
Pump - Vane type fixed displacement
Maximum operating pressure - 1000 psig

MIC.)MP ON S(1)(itinu

REGISTERED ALLOYS IN THE FORM OF XXX.0 CASTINGS, XXX.1 INGOT AND XXX.2 INGOT

AA NUMBER	FORMER DESIGNATION	REGISTERED DATE	PROD-UCTS(5)	Si	Fe	Cu	Mn	Mg	Cr	Ni	Zn	Sn	Ti	OTHERS		ALUMINUM min(4)
														Each	Total(3)	
305.0		11 5 74	S&P	4.5-5.5	0.6	1.0-1.5	0.50	0.10	0.25	—	0.35	—	0.25	0.05	0.15	Remainder
305.2		9 24 73	Ingot	4.5-5.5	0.14-0.25	1.0-1.5	0.05	—	—	—	0.05	—	0.20	0.05	0.15	Remainder
A305.0		11 5 74	S&P	4.5-5.5	0.20	1.0-1.5	0.10	0.10	—	—	0.10	—	0.20	0.05	0.15	Remainder
A305.1		6 4 74	Ingot	4.5-5.5	0.15	1.0-1.5	0.10	0.10	—	—	0.10	—	0.20	0.05	0.15	Remainder
A305.2		9 24 73	Ingot	4.5-5.5	0.13	1.0-1.5	0.05	—	—	—	0.05	—	0.20	0.05	0.15	Remainder
308.0	A108		S&P	5.0-6.0	1.0	4.0-5.0	0.50	0.10	—	—	1.0	—	0.25	—	0.50	Remainder
308.1	A108		Ingot	5.0-6.0	0.8	4.0-5.0	0.50	0.10	—	—	1.0	—	0.25	—	0.50	Remainder
308.2	A108		Ingot	5.0-6.0	0.8	4.0-5.0	0.30	0.10	—	—	0.50	—	0.20	—	0.50	Remainder
319.0	319, Allcast		S&P	5.5-6.5	1.0	3.0-4.0	0.50	0.10	—	0.35	1.0	—	0.25	—	0.50	Remainder
319.1	319, Allcast		Ingot	5.5-6.5	0.8	3.0-4.0	0.50	0.10	—	0.35	1.0	—	0.25	—	0.50	Remainder
319.2	319, Allcast		Ingot	5.5-6.5	0.6	3.0-4.0	0.10	0.10	—	0.10	0.10	—	0.20	—	0.20	Remainder
A319.0		8 28 70	S&P	5.5-6.5	1.0	3.0-4.0	0.50	0.10	—	0.35	3.0	—	0.25	—	0.50	Remainder
A319.1		8 28 70	Ingot	5.5-6.5	0.8	3.0-4.0	0.50	0.10	—	0.35	3.0	—	0.25	—	0.50	Remainder
B319.0	SAE 329	10 30 81	S&P	5.5-6.5	1.2	3.0-4.0	0.8	0.10-0.50	—	0.50	1.0	—	0.25	—	0.50	Remainder
B319.1		10 30 81	Ingot	5.5-6.5	0.9	3.0-4.0	0.8	0.15-0.50	—	0.50	1.0	—	0.25	—	0.50	Remainder
320.0		4 8 82	S&P	5.0-8.0	1.2	2.0-4.0	0.8	0.05-0.6	—	0.35	3.0	—	0.25	—	0.50	Remainder
320.1		4 8 82	Ingot	5.0-8.0	0.9	2.0-4.0	0.8	0.10-0.6	—	0.35	3.0	—	0.25	—	0.50	Remainder
324.0	324		P	7.0-8.0	1.2	0.40-0.6	0.50	0.40-0.7	—	0.30	1.0	—	0.20	0.15	0.20	Remainder
324.1	324		Ingot	7.0-8.0	0.9	0.40-0.6	0.50	0.45-0.7	—	0.30	1.0	—	0.20	0.15	0.20	Remainder
324.2	324	1 26 72	Ingot	7.0-8.0	0.6	0.40-0.6	0.10	0.45-0.7	—	0.10	0.10	—	0.20	0.05	0.15	Remainder
328.0	Red X-8		S	7.5-8.5	1.0	1.0-2.0	0.20-0.6	0.20-0.6	0.35	0.25	1.5	—	0.25	—	0.50	Remainder
328.1	Red X-8		Ingot	7.5-8.5	0.8	1.0-2.0	0.20-0.6	0.25-0.6	0.35	0.25	1.5	—	0.25	—	0.50	Remainder
332.0	F332.0 (F132)		P	8.5-10.5	1.2	2.0-4.0	0.50	0.50-1.5	—	0.50	1.0	—	0.25	—	0.50	Remainder
332.1	F332.1 (F132)		Ingot	8.5-10.5	0.9	2.0-4.0	0.50	0.6-1.5	—	0.50	1.0	—	0.25	—	0.50	Remainder
332.2	F332.2 (F132)		Ingot	8.5-10.0	0.6	2.0-4.0	0.10	0.9-1.3	—	0.10	0.10	—	0.20	—	0.30	Remainder
333.0	333		P	8.0-10.0	1.0	3.0-4.0	0.50	0.05-0.50	—	0.50	1.0	—	0.25	—	0.50	Remainder
333.1	333		Ingot	8.0-10.0	0.8	3.0-4.0	0.50	0.10-0.50	—	0.50	1.0	—	0.25	—	0.50	Remainder
A333.0		8 28 70	P	8.0-10.0	1.0	3.0-4.0	0.50	0.05-0.50	—	0.50	3.0	—	0.25	—	0.50	Remainder
A333.1		8 28 70	Ingot	8.0-10.0	0.8	3.0-4.0	0.50	0.10-0.50	—	0.50	3.0	—	0.25	—	0.50	Remainder
336.0	A332.0 (A132)		P	11.0-13.0	1.2	0.50-1.5	0.35	0.7-1.3	—	2.0-3.0	0.35	—	0.25	0.05	—	Remainder
336.1	A332.1 (A132)		Ingot	11.0-13.0	0.9	0.50-1.5	0.35	0.8-1.3	—	2.0-3.0	0.35	—	0.25	0.05	—	Remainder
336.2	A332.2 (A132)		Ingot	11.0-13.0	0.9	0.50-1.5	0.10	0.9-1.3	—	2.0-3.0	0.10	—	0.20	0.05	0.15	Remainder
339.0	Z332.0 (Z132)		P	11.0-13.0	1.2	1.5-3.0	0.50	0.50-1.5	—	0.50-1.5	1.0	—	0.25	—	0.50	Remainder
339.1	Z332.1 (Z132)		Ingot	11.0-13.0	0.9	1.5-3.0	0.50	0.6-1.5	—	0.50-1.5	1.0	—	0.25	—	0.50	Remainder
343.0	X443Z	10 27 72	D	6.7-7.7	1.2	0.50-0.9	0.50	0.10	0.10	—	1.2-2.0	0.50	—	0.10	0.35	Remainder
343.1	X443Z	10 27 72	Ingot	6.7-7.7	0.9	0.50-0.9	0.50	0.10	0.10	—	1.2-1.9	0.50	—	0.10	0.35	Remainder
354.0	354		P	8.6-9.4	0.20	1.6-2.0	0.10	0.40-0.6	—	—	0.10	—	0.20	0.05	0.15	Remainder
354.1	354		Ingot	8.6-9.4	0.15	1.6-2.0	0.10	0.45-0.6	—	—	0.10	—	0.20	0.05	0.15	Remainder
355.0	355		S&P	4.5-5.5	0.6(10)	1.0-1.5	0.50(10)	0.40-0.6	0.25	—	0.35	—	0.25	0.05	0.15	Remainder
355.1	355		Ingot	4.5-5.5	0.50(10)	1.0-1.5	0.50(10)	0.45-0.6	0.25	—	0.35	—	0.25	0.05	0.15	Remainder
355.2	355		Ingot	4.5-5.5	0.14-0.25	1.0-1.5	0.05	0.50-0.6	—	—	0.05	—	0.20	0.05	0.15	Remainder
A355.0		9 17 81	S&P	4.5-5.5	0.09	1.0-1.5	0.05	0.45-0.6	—	—	0.05	—	0.04-0.20	0.05	0.15	Remainder
A355.2		9 17 81	Ingot	4.5-5.5	0.06	1.0-1.5	0.03	0.50-0.6	—	—	0.03	—	0.04-0.20	0.03	0.10	Remainder
C355.0	C355		S&P	4.5-5.5	0.20	1.0-1.5	0.10	0.40-0.6	—	—	0.10	—	0.20	0.05	0.15	Remainder
C355.1		6 4 74	Ingot	4.5-5.5	0.15	1.0-1.5	0.10	0.45-0.6	—	—	0.10	—	0.20	0.05	0.15	Remainder
C355.2	C355		Ingot	4.5-5.5	0.13	1.0-1.5	0.05	0.50-0.6	—	—	0.05	—	0.20	0.05	0.15	Remainder
356.0	356		S&P	6.5-7.5	0.6	0.25	0.35	0.20-0.45	—	—	0.35	—	0.25	0.05	0.15	Remainder
356.1	356		Ingot	6.5-7.5	0.50	0.25	0.35	0.25-0.45	—	—	0.35	—	0.25	0.05	0.15	Remainder
356.2	356		Ingot	6.5-7.5	0.13-0.25	0.10	0.05	0.30-0.45	—	—	0.05	—	0.20	0.05	0.15	Remainder
A356.0	A356		S&P	6.5-7.5	0.20	0.20	0.10	0.25-0.45	—	—	0.10	—	0.20	0.05	0.15	Remainder
A356.1		6 4 74	Ingot	6.5-7.5	0.15	0.20	0.10	0.30-0.45	—	—	0.10	—	0.20	0.05	0.15	Remainder
A356.2	A356		Ingot	6.5-7.5	0.12	0.10	0.05	0.30-0.45	—	—	0.05	—	0.20	0.05	0.15	Remainder
B356.0		9 17 81	S&P	6.5-7.5	0.09	0.05	0.05	0.25-0.45	—	—	0.05	—	0.04-0.20	0.05	0.15	Remainder
[redacted]356.2	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted]	[redacted] 45	[redacted]	[redacted]	[redacted]	[redacted]	[redacted] 0.20	[redacted]	[redacted]	[redacted]

[redacted]

REGISTERED ALLOYS IN THE FORM OF XXX.0 CASTINGS, XXX.1 INGOT AND XXX.2 INGOT

AA NUMBER	FORMER DESIGNATION	REGISTERED DATE	PRODUCTS(5)	Si	Fe	Cu	Mn	Mg	Cr	Ni	Zn	Sn	Ti	OTHERS Each	OTHERS Total(3)	ALUMINUM min(4)
F356.0		10 20 71	S&P	6.5-7.5	0.20	0.20	0.10	0.17-0.25	—	—	0.10	—	0.04-0.20	0.05	0.15	Remainder
F356.2		10 20 71	Ingot	6.5-7.5	0.12	0.10	0.05	0.17-0.25	—	—	0.05	—	0.04-0.20	0.05	0.15	Remainder
357.0	357		S&P	6.5-7.5	0.15	0.05	0.03	0.45-0.6	—	—	0.05	—	0.20	0.05	0.15	Remainder
357.1	357		Ingot	6.5-7.5	0.12	0.05	0.03	0.45-0.6	—	—	0.05	—	0.20	0.05	0.15	Remainder
A357.0	A357		S&P	6.5-7.5	0.20	0.20	0.10	0.40-0.7	—	—	0.10	—	0.04-0.20	0.05(6)	0.15	Remainder
A357.2	A357		Ingot	6.5-7.5	0.12	0.10	0.05	0.45-0.7	—	—	0.05	—	0.04-0.20	0.03(6)	0.10	Remainder
B357.0		9 17 81	S&P	6.5-7.5	0.09	0.05	0.05	0.40-0.6	—	—	0.05	—	0.04-0.20	0.05	0.15	Remainder
B357.2		9 17 81	Ingot	6.5-7.5	0.06	0.03	0.03	0.45-0.6	—	—	0.03	—	0.04-0.20	0.03	0.10	Remainder
C357.0		9 17 81	S&P	6.5-7.5	0.09	0.05	0.05	0.45-0.7	—	—	0.05	—	0.04-0.20	0.05(6)	0.15	Remainder
C357.2		9 17 81	Ingot	6.5-7.5	0.06	0.03	0.03	0.50-0.7	—	—	0.03	—	0.04-0.20	0.03(6)	0.10	Remainder
358.0	B358.0 (Tens-50)		S&P	7.6-8.6	0.30	0.20	0.20	0.40-0.6	0.20	—	0.20	—	0.10-0.20	0.05(15)	0.15	Remainder
358.2	B358.2 (Tens-50)		Ingot	7.6-8.6	0.20	0.10	0.10	0.45-0.6	0.05	—	0.10	—	0.12-0.20	0.05(16)	0.15	Remainder
359.0	359		S&P	8.5-9.5	0.20	0.20	0.10	0.50-0.7	—	—	0.10	—	0.20	0.05	0.15	Remainder
359.2	359		Ingot	8.5-9.5	0.12	0.10	0.10	0.55-0.7	—	—	0.10	—	0.20	0.05	0.15	Remainder
360.0(11)	360		D	9.0-10.0	2.0	0.6	0.35	0.40-0.6	—	0.50	0.50	0.15	—	—	0.25	Remainder
360.2	360		Ingot	9.0-10.0	0.7-1.1	0.10	0.10	0.45-0.6	—	0.10	0.10	0.10	—	—	0.20	Remainder
A360.0(11)	A360		D	9.0-10.0	1.3	0.6	0.35	0.40-0.6	—	0.50	0.50	0.15	—	—	0.25	Remainder
A360.1(11)	A360		Ingot	9.0-10.0	1.0	0.6	0.35	0.45-0.6	—	0.50	0.40	0.15	—	—	0.25	Remainder
A360.2	A360		Ingot	9.0-10.0	0.6	0.10	0.05	0.45-0.6	—	—	0.05	—	—	0.05	0.15	Remainder
361.0		6 30 78	D	9.5-10.5	1.1	0.50	0.25	0.40-0.6	0.20-0.30	0.20-0.30	0.50	0.10	0.20	0.05	0.15	Remainder
361.1		6 30 78	Ingot	9.5-10.5	0.8	0.50	0.25	0.45-0.6	0.20-0.30	0.20-0.30	0.40	0.10	0.20	0.05	0.15	Remainder
363.0	363	1 16 70	S&P	4.5-6.0	1.1	2.5-3.5	(17)	0.15-0.40	(17)	0.25	3.0-4.5	0.25	0.20	(18)	0.30	Remainder
363.1	363	1 16 70	Ingot	4.5-6.0	0.8	2.5-3.5	(17)	0.20-0.40	(17)	0.25	3.0-4.5	0.25	0.20	(18)	0.30	Remainder
364.0	364		D	7.5-9.5	1.5	0.20	0.10	0.20-0.40	0.25-0.50	0.15	0.15	0.15	—	0.05(12)	0.15	Remainder
364.2	364		Ingot	7.5-9.5	0.7-1.1	0.20	0.10	0.25-0.40	0.25-0.50	0.15	0.15	0.15	—	0.05(12)	0.15	Remainder
369.0	Special K-9	4 4 78	D	11.0-12.0	1.3	0.50	0.35	0.25-0.45	0.30-0.40	0.05	1.0	0.10	—	0.05	0.15	Remainder
369.1	Special K-9	4 4 78	Ingot	11.0-12.0	1.0	0.50	0.35	0.30-0.45	0.30-0.40	0.05	0.9	0.10	—	0.05	0.15	Remainder
380.0(11)	380		D	7.5-9.5	2.0	3.0-4.0	0.50	0.10	—	0.50	3.0	0.35	—	—	0.50	Remainder
380.2	380		Ingot	7.5-9.5	0.7-1.1	3.0-4.0	0.10	0.10	—	0.10	0.10	0.10	—	—	0.20	Remainder
A380.0(11)	A380		D	7.5-9.5	1.3	3.0-4.0	0.50	0.10	—	0.50	3.0	0.35	—	—	0.50	Remainder
A380.1(11)	A380		Ingot	7.5-9.5	1.0	3.0-4.0	0.50	0.10	—	0.50	2.9	0.35	—	—	0.50	Remainder
A380.2	A380		Ingot	7.5-9.5	0.6	3.0-4.0	0.10	0.10	—	0.10	0.10	—	—	0.05	0.15	Remainder
B380.0	A380		D	7.5-9.5	1.3	3.0-4.0	0.50	0.10	—	0.50	1.0	0.35	—	—	0.50	Remainder
B380.1	A380		Ingot	7.5-9.5	1.0	3.0-4.0	0.50	0.10	—	0.50	0.9	0.35	—	—	0.50	Remainder
383.0			D	9.5-11.5	1.3	2.0-3.0	0.50	0.10	—	0.30	3.0	0.15	—	—	0.50	Remainder
383.1			Ingot	9.5-11.5	1.0	2.0-3.0	0.50	0.10	—	0.30	2.9	0.15	—	—	0.50	Remainder
383.2			Ingot	9.5-11.5	0.6-1.0	2.0-3.0	0.10	0.10	—	0.10	0.10	0.10	—	—	0.20	Remainder
384.0	384		D	10.5-12.0	1.3	3.0-4.5	0.50	0.10	—	0.50	3.0	0.35	—	—	0.50	Remainder
384.1	384		Ingot	10.5-12.0	1.0	3.0-4.5	0.50	0.10	—	0.50	2.9	0.35	—	—	0.50	Remainder
384.2	384		Ingot	10.5-12.0	0.6-1.0	3.0-4.5	0.10	0.10	—	0.10	0.10	0.10	—	—	0.20	Remainder
A384.0	384		D	10.5-12.0	1.3	3.0-4.5	0.50	0.10	—	0.50	1.0	0.35	—	—	0.50	Remainder
A384.1	384		Ingot	10.5-12.0	1.0	3.0-4.5	0.50	0.10	—	0.50	0.9	0.35	—	—	0.50	Remainder
385.0	B384.0 (384)	1 21 70	D	11.0-13.0	2.0	2.0-4.0	0.50	0.30	—	0.50	3.0	0.30	—	—	0.50	Remainder
385.1	B384.1 (384)	1 21 70	Ingot	11.0-13.0	1.1	2.0-4.0	0.50	0.30	—	0.50	2.9	0.30	—	—	0.50	Remainder
390.0	390		D	16.0-18.0	1.3	4.0-5.0	0.10	0.45-0.65	—	—	0.10	—	0.20	0.10	0.20	Remainder
390.2	390		Ingot	16.0-18.0	0.6-1.0	4.0-5.0	0.10	0.50-0.65	—	—	0.10	—	0.20	0.10	0.20	Remainder
A390.0	A390		S&P	16.0-18.0	0.50	4.0-5.0	0.10	0.45-0.65	—	—	0.10	—	0.20	0.10	0.20	Remainder
A390.1	A390		Ingot	16.0-18.0	0.40	4.0-5.0	0.10	0.50-0.65	—	—	0.10	—	0.20	0.10	0.20	Remainder
B390.0		3 29 79	D	16.0-18.0	1.3	4.0-5.0	0.50	0.45-0.65	—	0.10	1.5	—	0.20	0.10	0.20	Remainder
B390.1		3 29 79	Ingot	16.0-18.0	1.0	4.0-5.0	0.50	0.50-0.65	—	0.10	1.4	—	0.20	0.10	0.20	Remainder
392.0	392		D	18.0-20.0	1.5	0.40-0.8	0.20-0.6	0.8-1.2	—	0.50	0.50	0.30	0.20	0.15	0.50	Remainder
392.1	392		Ingot	18.0-20.0	1.1	0.40-0.8	0.20-0.6	0.9-1.2	—	0.50	0.40	0.30	0.20	0.15	0.50	Remainder
393.0	Vanasil		SP&D	21.0-23.0	1.3	0.7-1.1	0.10	0.7-1.3	—	2.0-2.5	0.10	—	0.10-0.20	0.05(14)	0.15	Remainder
393.1	Vanasil		Ingot	21.0-23.0	1.0	0.7-1.1	0.10	0.8-1.3	—	2.0-2.5	0.10	—	0.10-0.20	0.05(14)	0.15	Remainder
393.2	Vanasil		Ingot	21.0-23.0	0.8	0.7-1.1	0.10	0.8-1.3	—	2.0-2.5	0.10		0.10-0.20	0.05(14)	0.15	Remainder

See footnotes on page 8.

APPENDIX 4

CALIBRATION DATA

PITOT CALIBRATION DATA

LOCATION: ATMOSPHERIC ENVIRONMENT SERVICE
S-TYPE IDENTIFICATION: BLUE 7' PROBE
PROBE NOZZLE SIZE: 1/4"
DATE: AUGUST 20, 1986

TEST VELOCITY NUMBER (m/s)	WIND TUNNEL STATIC (mm H_2O)	DELTA P STD (mm H_20)	DELTA P S TYPE (mm H_20)
4.11	-2.1	1.1	1.6
8.28	-7.5	4.2	6.4
11.35	-13.5	8.0	12.0
15.53	-21.2	14.9	22.9
18.56	-34.2	21.5	32.5

CALIBRATION FACTOR:	0.806
CORRECTION:	0.99999
INTERCEPT:	0.0251

ONTARIO RESEARCH FOUNDATION
DRY GAS METER CALIBRATION
BRITISH UNITS

BLUE BOX

METER NO: 13 DG-8520226

DATE: AUG.28,1985
OPERATOR: S.H.
AVERAGE METER FACTOR: 0.996

TEST #	GASOMETER		DRY GAS METER			BAROMETRIC PRESSURE "Hg	DRY GAS METER FACTOR
	VOLUME FT3	TEMP. o F	VOLUME FT3	METER INLET TEMP. o F	METER INLET PRESSURE " H2O		
1	2.347	75	2.281	60	0.40	30.18	0.999
2	2.347	75	2.283	60	0.40	30.18	0.998
3	2.343	75	2.291	60	0.40	30.18	0.993
4	2.517	75	2.447	60	0.80	30.18	0.998
5	2.361	75	2.305	60	0.80	30.18	0.994
6	2.352	75	2.285	60	0.80	30.18	0.999
7	2.357	75	2.307	60	1.20	30.18	0.990
8	2.352	75	2.282	60	1.20	30.18	0.999
9	2.343	75	2.281	60	1.20	30.18	0.995
10	2.343	75	2.280	60	1.60	30.18	0.991
11	2.352	75	2.286	60	1.60	30.18	0.996
12	2.352	75	2.290	60	1.60	30.18	0.994

IMET

NOZZLE DATA SHEET

IDENTIFICATION: Blue #3

MATERIAL: SS.

MEASURED DIAM. 0.244 in.

DATE: June 18 1986

MEASURED DIAM. (1) 6.15 mm

(2) 6.25 mm MEAN 6.20 mm

(3) 6.25 mm

(4) 6.15 mm

MAX = 6.25 mm

MIN = 6.15 mm

*RANGE = 0.1 mm

SIGNATURE:

* Maximum is 0.10 mm. Unit is unacceptable if higher than this.

TD
888
.M4
A48
1987